

The Radulae of Nine Species of Mitridae

(Mollusca : Gastropoda)

BY

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(Plate 19; 9 Text figures)

INTRODUCTION

IN RECENT YEARS more and more attention is being given to the study of mitrid radulae. CERNOHORSKY (1966) has provided the largest and most comprehensive recent work, covering about 50 species; even so, the total of known, accurately identified mitrid radulae still stands at only around 100 species. Helpful as this is to workers in this group, we have to admit that it is only a beginning, in a family comprised possibly of some 500 to 600 Recent species. It has been seen that our new knowledge of many of the radulae is negating the earlier generic and subgeneric placements of certain species whose taxonomic assignments were based on shell morphology alone. Consequently, it is evident that at some future date the Mitridae will need to be thoroughly revised, with totally new concepts of the genera and subgenera different from those we know now. However, with such a slow trickle of information as is presently becoming available, it would seem to me premature to attempt to make such drastic changes at this time, for the radula patterns of approximately 85% of the species are still unknown. It may well be that the radula will prove to be of greater (or, possibly, lesser!) importance than is accepted today. Certainly the morphological characters can not be totally ignored, for it is seldom indeed that live-collected material becomes available for radula study and it may be many years before a relatively complete knowledge of all the species can be obtained. It seems to me that the conchologists must, therefore, continue to arrange their collections in groupings of "look-alike" shells; i. e., as nearly as possible in the recognized genera and subgenera, however arbitrary and artificial a system this may be according to the radular characters.

A case in point is *Strigatella columbellaeformis* (KIENER, 1839). The morphological features of this species fit the description of the typical *Strigatella* so well as to be almost amusingly "supertypical." Its features seem an exaggerated version of SWAINSON's description: "Size

very small; spire thick, obtuse; outer lip thickened, and often reflected in the middle; aperture smooth." CERNOHORSKY (1966a) has shown that the radula pattern of this species renders its placement in *Strigatella* incorrect, and that it should be assigned more correctly to *Mitra* s. s. It comes down, then, to the very practical consideration of how museum curators and private collectors shall curate their collections, with such apparently "typical" forms really belonging, according to their radular characters, alongside morphologically completely dissimilar forms. This problem is negligible in small collections, but with a collection of Mitridae numbering into the hundreds of species and thousands of specimens it becomes important to have the similar species grouped together.

If a student were, for example, to bring to a large museum for identification a typical small, drab, brown strigatelliform shell, the most logical place to seek its identity would be among the Strigatellas. Unless the curator happened to be a specialist in Mitridae he would be more than likely to overlook a comparison of the unknown form with "*Mitra*" *columbellaeformis* which had been placed, in accordance with its radular pattern, together with such typical mitrid forms as the showy, red-spotted, elongate and pointed *Mitra mitra* (LINNAEUS, 1758), and not among the Strigatellas. Only by a slow, painstaking comparison with every species in the *Mitra* collection could an identification be made under this system, whereas the smaller sub-grouping of all shells having *Strigatella* characters would normally make it easy to locate the name within a relatively short time.

It seems that the whole question may already have resolved into an argument between the supporters of the shell-morphology school of thought and the champions of the radula pattern, in somewhat the same way *Cypraea* collectors have their "lumpers and splitters" — though for slightly different reasons. Both may be correct in their different views; who can say, at this early stage, which has

the ultimate single answer? I believe we must continue to strive for the solution by continuing to study additional radula material, but not to make the final decision until vastly larger numbers of species have been studied. At the present time only about 15% of the mitrid radulae are known; it would seem to me that nearer 90% should be known before the radical revision can be undertaken that will decide the question once and for all.

To add to our slowly increasing series of radula studies in Mitridae, I offer here illustrations of the shells and radulae of nine species of *Mitra* and *Vexillum*. Seven of these are either previously unrecorded or at least not specifically verified through references to adequate illustrations. Two radulae (*Mitra idae* MELVILL, 1893 and *Strigatella tristis* (BRODERIP, 1836)) have recently been figured by CERNOHORSKY (1966) but without accompanying illustrations of the shells. My work corroborates his findings on these two species.

MATERIAL AND METHODS

The radula preparations were made by me during the past three years, whenever appropriate fresh material became available: the radulae were extracted through the use of potassium hydroxide solutions, dehydrated in alcohol series, stained with Acetocarmine and mounted in Euparal on glass slides. The text figures were prepared for publication by Mrs. Emily Reid.

OBSERVATIONS

Study of these radulae resulted in no unexpected changes of assignment of the species to their respective genera, with the exception of *Mitra* (*Cancilla*) *verrucosa* (REEVE, 1845) (see Plate 19, Figure 7). CERNOHORSKY (1965) tentatively placed this species in *Vexillum*, but while its morphology does present a conflicting set of characters, its placement in *Cancilla* is justified on morphological grounds as well as radula characters. It is a puzzling species, for the reason that it bears spiral rows of prominent nodules throughout; from one viewpoint it could be said that the nodules are aligned in axial rows (making it eligible for assignment to *Vexillum*), whereas from another viewpoint the nodules could be considered to be arranged spirally in concentric rows. After a good deal of study when I first added this species to my collection several years ago, I concluded that the axial alignment was more or less accidental, and decided to place it among the *Cancillas* on the basis of the concentricity of the rows of nodules; the radula now supports this decision. The nodules are an atypical feature of most species of *Cancilla*, but the con-

centric sculpture is a character that places it without question in that subgenus.

1. *Mitra idae* MELVILL, 1893
(Plate 19, Figure 1)

Animal: Foot, body, siphon and tentacles pure porcelain-white. Eyes situated at base of tentacles. Sexes separate.

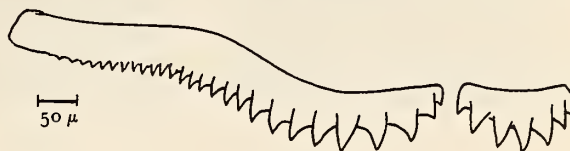


Figure 1
Half-Row of Radula of *Mitra idae* MELVILL
Specimen collected in 50 feet off Point Loma, San Diego, California
by Glen Bickford

2. *Mitra belcheri* HINDS, 1832
(Plate 19, Figure 2)

Animal: Unknown (received in dried-out condition).

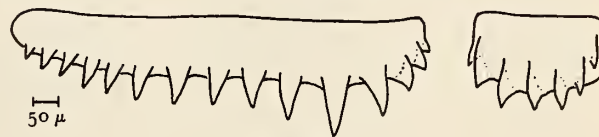


Figure 2
Half-Row of Radula of *Mitra belcheri* HINDS
Specimen trawled in deep water off Guaymas, West Mexico
by shrimp fishermen

3. *Mitra zaca* STRONG, HANNA & HERTLEIN, 1933
(Plate 19, Figure 3)

Animal: Unknown (received in dried-out condition).

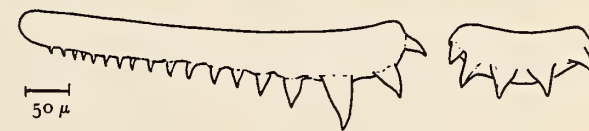


Figure 3
Half-Row of Radula of *Mitra zaca* STRONG, HANNA & HERTLEIN
Specimen trawled in deep water off Guaymas, West Mexico
by shrimp fishermen

4. *Mitra terebralis* LAMARCK, 1811
(Plate 19, Figure 4)

(synonyms: *Mitra incompta* LIGHTFOOT, 1786; *M. tessellata* MARTYN, 1786)

Animal: Top of foot mottled with tan. Base of foot cream, tinged with reddish brown. Tentacles pale tan tipped with

white. Siphon banded proximally from the tip with white, brown and light tan, each color grading into the next (C. S. Weaver, pers. comm.). Length 80.9 mm, width 20.8 mm. leg. C. S. Weaver, Oahu, Hawaii, 1961.



Figure 4
Half-Row of Radula of *Mitra terebralis* LAMARCK
Specimen described above.

5. *Mitra aurora* DOHRN, 1860
(Plate 19, Figure 5)

Animal: Unknown.

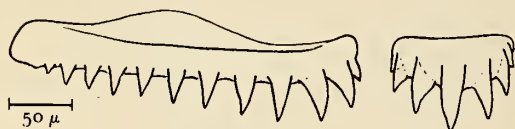


Figure 5
Half-Row of Radula of *Mitra aurora* DOHRN
Specimen collected in 15 feet of water, in sand under dead coral
off Barber's Point, Oahu, Hawaii; leg. C. S. Weaver

6. *Strigatella tristis* (BRODERIP, 1836)
(Plate 19, Figure 6)

Animal: Foot, body, siphon and tentacles creamy-beige;
eyes situated at base of tentacles.



Figure 6
Half-Row of Radula of *Strigatella tristis* (BRODERIP)
Specimen collected at Puertecitos, Baja California, Mexico;
leg. Fay Wolfson

7. *Mitra (Cancilla) verrucosa* REEVE, 1845
(Plate 19, Figure 7)

Animal: Unknown.



Figure 7
Radular Row of *Mitra (Cancilla) verrucosa* REEVE
Specimen collected at Mauban, Quezon, Philippines;
F. G. Dayrit, don.

8. *Mitra (Cancilla) hindsii* REEVE, 1844
(Plate 19, Figure 8)

Animal: Unknown.



Figure 8
Half-Row of Radula of *Mitra (Cancilla) hindsii* REEVE
Specimen collected in 20 fathoms off Baco-chibampo Bay,
West Mexico. leg. Gale G. Sphon, Jr.

9. *Vexillum taeniatum* (LAMARCK, 1811)
(Plate 19, Figure 9)

Animal: Unknown.

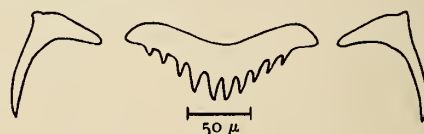


Figure 9
Radular Row of *Vexillum taeniatum* (LAMARCK)
Specimen collected by A. Jennings at Akuilau Island, Fiji
and kept in his aquarium until it died. He then generously sent it
to me intact so that I could obtain the radula without damaging the
shell; the animal had completely decomposed. This is the
specimen figured on Plate 19, Figure 9.
Length 50.9 mm, width 10.9 mm.

Explanation of Plate 19

Figure 1: *Mitra idae* MELVILL, 1893 ($\times 1\frac{1}{4}$)

Figure 2: *Mitra belcheri* HINDS, 1832 ($\times \frac{1}{2}$)

Figure 3: *Mitra zaca* STRONG, HANNA & HERTLEIN, 1933 ($\times \frac{1}{2}$)

Figure 4: *Mitra terebralis* LAMARCK, 1811 ($\times \frac{3}{8}$)

Figure 9: *Vexillum taeniatum* (LAMARCK, 1811) ($\times \frac{7}{8}$)

Figure 5: *Mitra aurora* DOHRN, 1860 ($\times 2$)

Figure 6: *Strigatella tristis* (BRODERIP, 1836) ($\times 2$)

Figure 7: *Mitra (Cancilla) verrucosa* REEVE, 1845 ($\times 3$)

Figure 8: *Mitra (Cancilla) hindsii* REEVE, 1844 ($\times 2\frac{1}{2}$)



Figure 1



Figure 2



Figure 3



Figure 4



Figure 5



Figure 6



Figure 7



Figure 8



Figure 9